

## LuOcean P2

**LU09xxC Diode Laser**  
**Up to 270 W c.w. Operating Power @ 915 nm, 940 nm or 976 nm**



### Description:

The LuOcean™ P2 Diode Laser series offers OEM integrators an excellent product to manufacture state-of-the-art end user laser systems. The easy integration and safe use of these laser components give the chance to be cost-efficient in development and manufacturing. Equipped with several accessories and features the Lumics diode lasers comply with CE & ROHS requirements. Lumics warranties highest reliability single emitter technology through careful design, extensive burn-in, long life-time & thermal testing.

### Features & Functions:

- Wavelength 915, 940 or 976 nm
- Burn-in tested single emitters
- Fiber: 105, 200, 400 or 600  $\mu$ m
- SMA905
- Sealed housing
- Temperature sensor

### Options:

- Power monitor
- Fiber sensor
- Red or green pilot laser
- Water cooling plate
- Backreflection filter

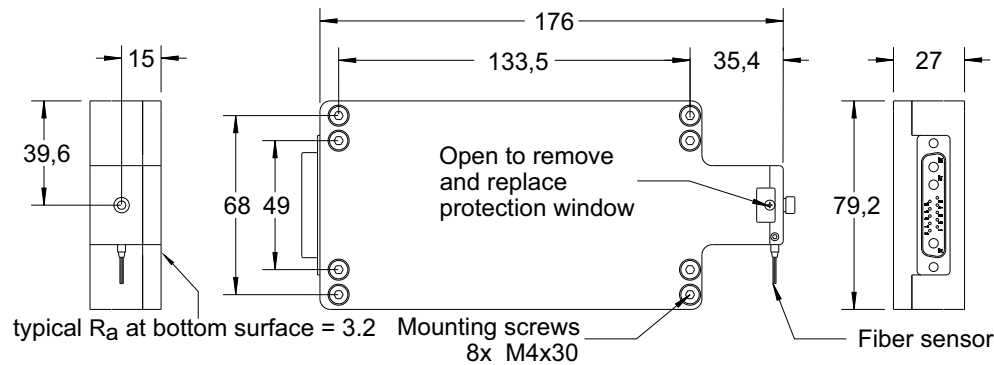
### Benefits:

- Small foot print
- Ultra long lifetime
- Cost effective
- High efficiency
- Protective exit window option

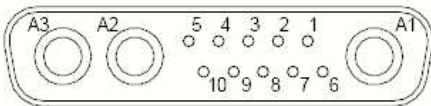
### Applications:

- Pumping
- Illumination
- Medical treatment

### Module Drawing (Dimensions in mm)



13w3 male Power and Signal Connector



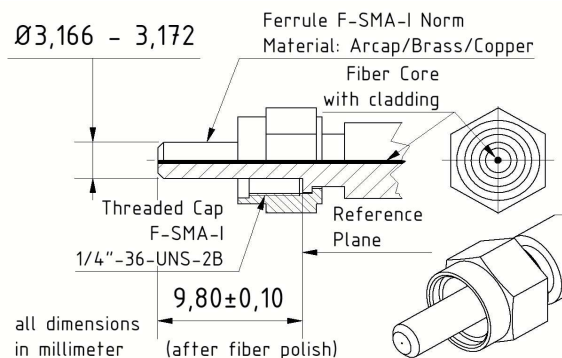
### Pin Configuration

Pin	Configuration
1	2nd LM35 signal or NTC or PT100/1000 * or pilot power control (0-5)V *
2	2nd LM35 5V or NTC or PT100/1000 * or signal internal fiber sensor
3	Monitor diode cathode or internal fiber sensor 12V *
4	1st and 2nd LM35 (GND1) Monitor diode (GND1) Internal fiber sensor (GND1)
5	1st LM35 signal or NTC or PT100/1000 *
6	Monitor diode signal 2 *
7	Monitor diode signal 1 *
8	Pilot laser (GND2)
9	1st LM35 5V or NTC or PT100/1000
10	Pilot laser 8 V (green) or 5 V (red) *
A1	Laser diode (+)
A2	Laser diode cathode (-)
A3	N.C.

\* Optional

### Fiber Connector

- (1) Lumics laser diode fiber coupling technology ensures loss into the fiber cladding of <2% of the total power if the fiber centricity is below 10 $\mu$ m and ferrule diameter and distance of the fiber end facet to the reference plane complies with shown technical drawing. Use a fiber microscope to check for dust free fiber end facet and fiber centricity.
- (2) Free standing fibers suffer from higher risk of fiber damage to the fiber tip due to mechanical stress by handling and the fiber end facet can not be polished as simple as for not free standing fibers.
- (3) For more information see [http://www.lumics.de/wp-content/uploads/lu\\_fiber\\_patchcords.pdf](http://www.lumics.de/wp-content/uploads/lu_fiber_patchcords.pdf)



**We manufacture diode lasers.**

## Electrical and Optical Characteristics

Typical Laser specifications at 25° C \*

Parameter	Conditions	Symbol	45W in 105µm	160 W in 200µm	240W in 400µm	270W in 600µm	Unit
<b>LU0915C, LU0940C and LU0975C</b>							
Maximum output power (1)	c.w.	P <sub>op</sub>	45	160	240	270	W
Operating current (2)	c.w.	I <sub>op</sub>	11.0	16	24	27	A
Absolut maximum forward current (2)	c.w.	I <sub>max</sub>	11.5	16.7	25	28	A
Peak wavelength at lop (6)	LU0915C	λ	915 ±10	915 ±10	915 ±10	915 ±10	nm
	LU0940C	λ	940 ±10	940 ±10	940 ±10	940 ±10	nm
	LU0976C	λ	976 ±10	976 ±10	976 ±10	976 ±10	nm
Spectral width (FWHM)	lop	Δλ	2-7	2-7	2-7	2-7	nm
Threshold current (typical)		I <sub>th</sub>	0.7	1	2.2	2.6	A
Operating voltage (maximum)		V <sub>f</sub>	9.5	21	21	21	V
Conversion efficiency (maximum)			42	42	42	42	%
Wavelength tuning vs. temperature		λ / T	0.3	0.3	0.3	0.3	nm/K
Wavelength tuning vs. operating current		λ / I	1	0.6	0.5	0.5	nm/A
Weight		m	1200	1200	1200	1200	g
Thermal resistance (bottom to temp. sensor)		R <sub>th</sub>	0.04	0.04	0.04	0.04	K/W
<b>Output fiber (SMA905)</b>							
Core diameter of output fiber (minimum)		d <sub>core</sub>	105 **	200	400	600	µm
Fiber centricity			± 5	± 10	± 10	± 10	µm
Numerical aperture		NA	0.22	0.22	0.22	0.22	
Temperature sensor			LM35, NTC (10k) or PT100/1000 (please specify)				
Power monitor		PD	5-30	5-30	5-30	5-30	mV/W
<b>Options</b>							
<b>Option 1: Red pilot laser</b>							
C.w. output power min. value (4)		P <sub>pilot</sub>	1-3	1-3	1-3	1-3	mW
Peak wavelength		λ <sub>pilot</sub>	635 ± 10	635 ± 10	635 ± 10	635 ± 10	nm
Operating voltage			5	5	5	5	V
<b>Option 2: Green pilot laser</b>							
C.w. output power min. value (4)		P <sub>pilot</sub>	1-2	1-2	1-2	1-2	mW
Peak wavelength		λ <sub>pilot</sub>	520 ± 10	520 ± 10	520 ± 10	520 ± 10	nm
Operating voltage			8	8	8	8	V
Pilot power control		P <sub>pilot_contr</sub>	0-5	0-5	0-5	0-5	V
<b>Option 3: Water cooling base plate w/o cap</b>							
Recommended water temperature		T	<18	<18	<15	<15	°C
Minimum water flux (Industrial Water, no DI-water)			0.3	1.5	2.0	2.4	l/min
<b>Option 4: Fiber sensor</b>							
Internal (resistive) fiber detection sensor supply voltage				12		V	
A second fiber sensor is an external inductive sensor with three wire cable (Vcc=12V, GND, Signal 12/2V when fiber is plug/not plugged)							
Option 5: 1064nm backreflection filter (35dB on request) (5)			18	18	18	18	dB

Notes: \* taken at internal temperature sensor, **Laser wavelength between 880nm and 920nm** require an AR <0.7% (+10nm around peak wavelength) coated fiber facet or end cap on fiber facet module side or power reduction of 30%. Avoid direct feedback from materials like mirrors, optics, processed material etc. back into laser module via the fiber cable by more than 10%.

\*\* LuOcean P2 in 105 µm fiber is supplied either in combination with water cooling base plate (option 3) or with a copper base plate for cooled and uncooled operation

- (1) Power is measured ex fiber according to given fiber specifications including measures and tolerances of fiber and ferrules for uncoated fiber facets (**exception see \***).
- (2) Do not exceed maximum forward current by more than 5% above given operating current and if given by the maximum current otherwise the laser diode may be damaged.
- (3) Rule of thumb: Power ex fiber decreases up to 5% (<1100nm) and up to 7% (>1400nm) every 10 °C temperature increase at internal temperature sensor. Lifetime decreases by about factor of two every 10 °C. Required flatness of customer heat sink 0.05mm over 150mm to achieve necessary contact to the heat sink.
- (4) Red and green minimum pilot power is set at factory by customer request. Standard is 1 mW.
- (5) Back reflection at 1064nm is considered as 10ns pulse with 5% d.c. max. Back reflection filter reduces power by 2% (18dB) or 4% (35dB).

Calculation example of necessary water temperature for 100 W output power:

Thermal load = Output power \* (1/conversion efficiency - 1), Water temperature = internal temperature - thermal load \* Thermal resistance  
 Example: Output power: 100 W, Conversion efficiency: 0.4, Thermal resistance: 0.07 K/W, Internal temperature: 25 °C  
 Thermal load = 100 W \* (1/0.4 - 1) = 150 W, Water temperature = 25 °C - 150 W \* 0.07 K/W = 15 °C, (water flux must be adjusted accordingly)

## Absolute Maximum Ratings / General Informations

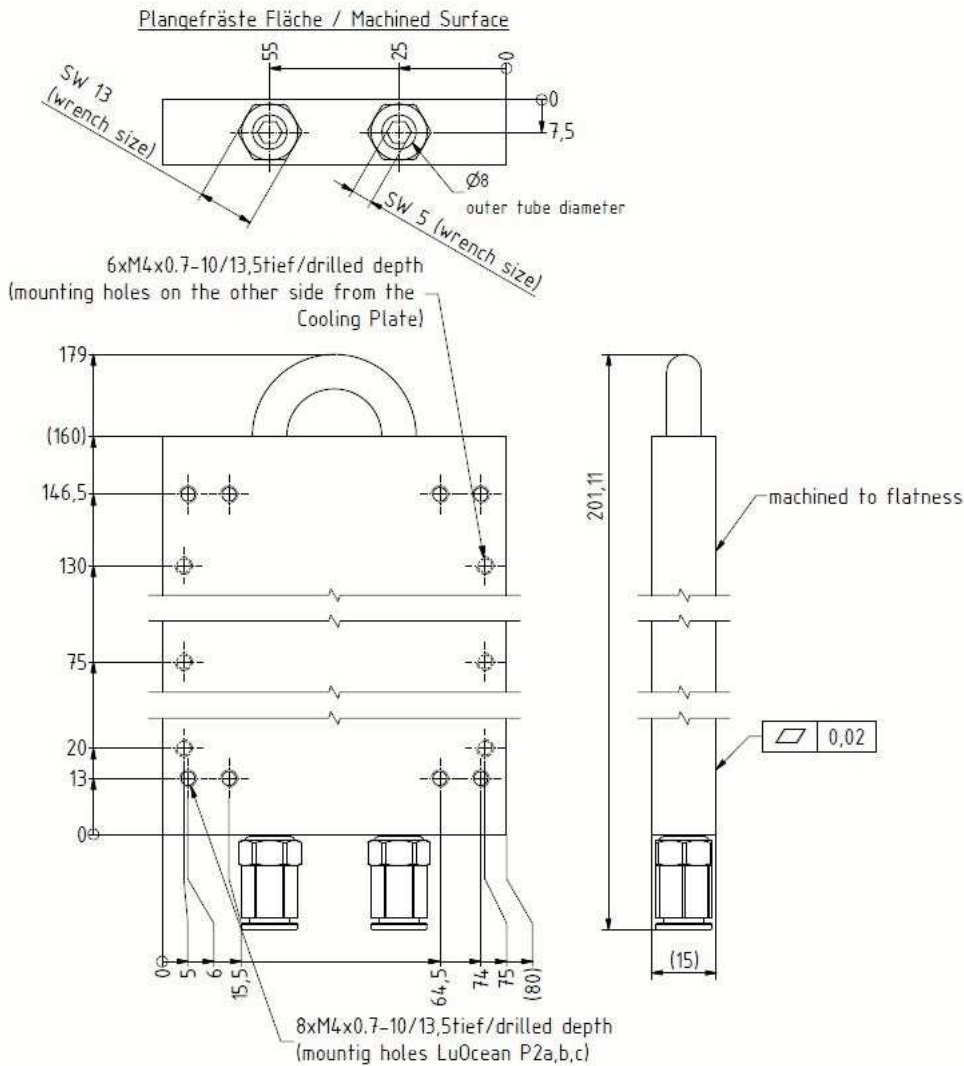
Parameter	Symbol	Min	Max	Unit
Storage temperature	$T_{max}$	0	+50	°C
Operating temp.* c.w.-operation **	$T_{op\ c.w.}$	+15	+35	°C
Humidity / non condensing atmosphere			90	%
Recommended thermal heatsink resistance $R_{th}$			0.03	K/W
Max fiber flange temperature			45	°C
Max. back reflection of intrinsic pump wavelength output power			10	%
Max. back reflection any other than $\lambda$ of this diode laser			10	$\mu$ J
Compliance		CE, ROHS		
<b>Standard Accessories</b>				
Interface connector		13w3 Female		
Mounting screws / metric		8 x M4 x 12		
Remarks				

\* taken at internal temperature sensor

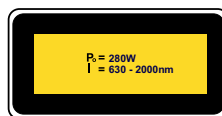
\*\* we recommend to operate the laser above dew point

### Option: P2 water cooling base plate with quick release water connectors and thermal resistance of 0.03 K/W.

Please note : Avoid to remove the water cooling plate from the P2 laser module because the optics is aligned with the water cooling plate attached to the P2 module. If it is removed the housing might relax mechanically which move the fiber coupling port/nose away from the focused light spot. Never change to a water cooling with a lower specifications regarding flatness



## User Safety



Important Note Read and carefully follow operating manual instructions. Especially, whenever power supply is switched on or off, always disconnect from laser module. See manual for details. Uncontrolled on / off switching may cause spikes and result in fatal device damage. This product is not certified by with IEC 60825-1 or 21CFR1040.10/21CFR1040.11 and must comply with the applicable regulations by the Purchaser if sold as laser product.

**We manufacture diode lasers.**